The Refrigeration Service Engineer

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Service Pointers—Reconditioning Float Valves—Oil Burner Servicing—Electric Motors—Ice Cream Cabinets—"Kinks"

The REFRIGERATION SERVICE ENGINEER

Devoted to the Servicing of
REFRIGERATION UNITS *and* OIL BURNERS

VOL. I JUNE, 1933 NO. 1

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The Refrigeration Service Engineer

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

OFFICIAL ORGAN REFRIGERATION SERVICE ENGINEERS' SOCIETY

VOL. 1, NO. 1 CHICAGO, JUNE, 1933 $2.00 Per Annum

Editorial Announcement

EVERY profession, avocation, industry or business has its official organ or special publication to keep it informed on the latest developments in its field and to provide a convenient medium for an exchange of ideas and experiences of those engaged in their particular line of human endeavor.

The refrigeration industry in all its branches has been well provided for, beginning with the publication of *Ice and Refrigeration* (July, 1891), the pioneer journal in that field and for many years the only exponent of the industry, setting forth the importance of refrigeration, not only in the development of trade and commerce of the country, but also in its contribution to the welfare and confidence of the people making a pleasant-day life possible.

The advent of the household refrigeration machine, however, called into being another branch of the engineering profession which has developed into a real business, that of servicing these household and small commercial refrigerating units.

Sixteen years ago, an editorial in *Ice and Refrigeration* stated that the introduction of the then new electric refrigerators would not likely prove a commercial success until the manufacturers of such equipment were prepared to properly service same.

The prophecy proved to be true. The production and merchandising of these small units soon fell into the hands of large and well financed corporations, who immediately organized service departments and schools for the training of service men. As quite natural, independent service concerns sprang into being and these found ready employment with manufacturers of new equipment not provided with a service department. The failure of many distributors of refrigeration equipment and the necessary business readjustment released many trained service men who sought to capitalize on the training they had received by establishing themselves as independent service engineers.

Many of these men have been placed at a disadvantage because of the fact that their factory training made them efficient in servicing only one make of machine. The need for further education and training has in a measure been met by inde-

pendent refrigeration training schools, and there has also been drawn into the field a number of engineers having had education, training and experience in the operation of large refrigeration equipment.

Still, there was no medium covering exclusively the servicing of small refrigeration machines, or a medium for the exchange of ideas and experiences on this particular phase of the subject. The merchandising, sales and news end of the business of the distribution of electrical refrigerators has been well covered by *Electric Refrigeration News*, now in its seventh year of usefulness.

To meet the need for a special organ and to round out the line of publications devoted to the various branches of refrigeration, the publishers of *Ice and Refrigeration*, having been asked to sponsor a national educational society composed of service men, decided to again pioneer by starting a magazine devoted exclusively to the interests of the service man engaged in servicing household and small commercial refrigeration units, oil burners and other household mechanical equipment.

It seems logical that the householder should be able to depend upon one efficient service concern or individual to take care of and keep in good working order all such equipment.

Therefore, THE REFRIGERATION SERVICE ENGINEER is herewith presented to the service men of the country. It is pledged to serve their interests only and to that end proposes to bring to them in each and every issue reliable and authentic information regarding the servicing of household and small commercial refrigeration machines, oil burners and other household mechanical equipment. It will give the latest information as to new developments in such equipment. It proposes to encourage the adoption of ethical standards of practice and assist in stabilizing servicing as a business.

The new publication offers a forum for the exchange of ideas and experiences, open to all, including the service men connected with the service departments of manufacturers, distributors and dealers, or with independent service organizations, as well as all individual service men and managers of service departments.

THE REFRIGERATION SERVICE ENGINEER has no pet theories to advance and no man or class of men has any private influence with it. Its columns are open to all interested in the advancement and improvement of service engineering. It will strive to become indispensable to all. It will point out the advisability of the refrigeration service engineer, broadening the scope of his activities in order to establish and maintain his business on a more stable all-the-year basis.

As the official organ of the Refrigeration Service Engineers' Society, it will endeavor to promote the interests of the Society by the publication of reports covering its educational program and association activities, assist in the enlargement of its membership and the formation of local chapters.

We hope you will like THE REFRIGERATION SERVICE ENGINEER and its convenient pocket size. We ask your hearty cooperation in increasing its usefulness in this field, and constructive suggestions which will assist in the advancement of its educational policy will always be welcome.

J. F. NICKERSON, *Editor and Publisher.*

Re-Conditioning a Float Valve

A Successful Method Is Described in This Article. Complete Description and Diagram Showing How to Build an Inexpensive Float Valve Test Outfit from Parts Available in the Shop.

By RALPH B. VANSTON
Great Northern Refrigeration Service, Chicago

THE service man is often called upon to recondition a float valve and one very successful method and process to employ is as follows:

Take out the pin which secures the float ball and arm to the float valve lever bracket and remove the float ball. Remove and dispose of the needle and pin, then remove the seat.

The First Step—Examine needle under magnifying glass to ascertain condition of point of contact with seat. If upon examination it is found needle point is pitted and badly worn, use new needle. If, on the contrary, it is found that the needle is not badly worn, proceed as follows:

The Second Step—Place slightly worn needle in the chuck of bench drill press. Start drill press. With the drill press in operation, be sure the needle is true before applying hone. Apply hone in such a manner as to resurface needle point without changing degree of angle. During this operation frequent examinations are desirable, using magnifying glass for this purpose.

The Third Step—A float ball when subjected to freezing temperatures sometimes develops a slight leak. Our method of ascertaining as to whether a float ball leaks or not is to place same in SO_2. This can best be accomplished by placing the float ball in a cooling coil which is free from moisture.

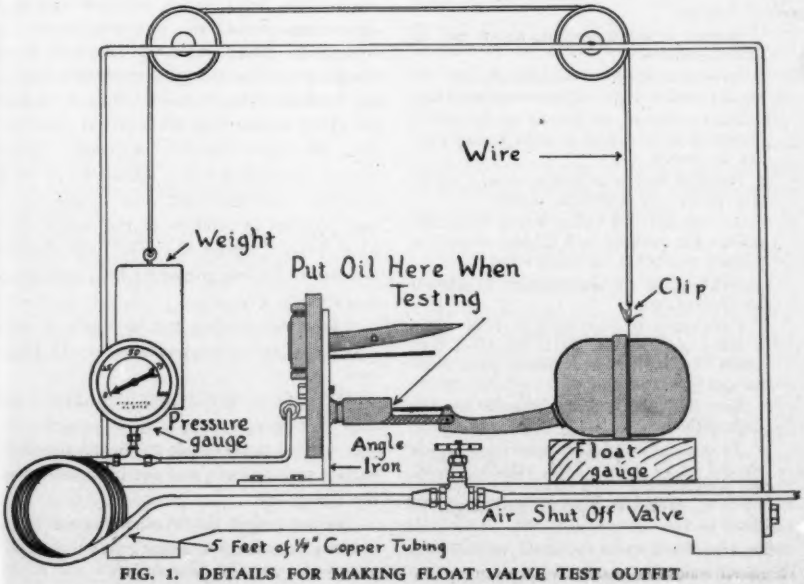


FIG. 1. DETAILS FOR MAKING FLOAT VALVE TEST OUTFIT

After float ball has been placed in cooling coil and same has been properly sealed, draw a vacuum and charge with liquid sulphur dioxide. After a ten minute period, pump down coil, remove float ball and submerge into boiling water. The heat of the boiling water will cause rapid evaporation of any sulphur dioxide that may be in float ball. Pressure caused by evaporation will form bubbles at point of leak; leak can be eliminated by soldering at this point.

The Fourth Step—A No. 54 drill should be used to clean out the small hole into which the needle fits. Clean thoroughly all parts with compressed air before assembling.

Assemble the float valve.

The Fifth Step—Mount the assembled float valve on test stand, an illustration of which appears as Fig. 1.

Making a Test Outfit

The test outfit in Fig. 1 can be readily made. You will find many spare parts around the shop that will come in handy in making this test outfit. Practically all the material necessary can be thus found. The diagram will be helpful in constructing your test outfit. Instructions for making same are as follows:

Secure a small weight, about ten to eleven ounces.

Overhead pulley frame should be twelve inches high, eighteen inches long.

Pulley should be placed in frame as shown in illustration—twelve inches center to center.

Base of test equipment should measure twelve by eighteen inches.

An air shut-off valve, fitted with half unions for quarter-inch tubing, should be placed as shown in illustration.

Next place pressure gauge as shown in illustration.

Care must be exercised in float valve bracket mountings. It is essential that when float valve is mounted, same shall be perfectly level.

The float ball gauge should be 1¼ inches thick.

To one end of picture wire cord, which should be 24 inches long, attach weight. As shown in the illustration, run the wire up and over the pulleys and down to float ball.

To test float valve proceed as follows: The needle should be seated by allowing the weight to drop five inches. Before this is done, however, hold the float ball up so that the needle is in position. This should never be done more than once to properly seat the needle.

When the float ball is up closing the valve, there should be just enough space between the valve and the stand below to allow the float ball gauge to slide beneath the ball as shown in illustration, Fig. 1.

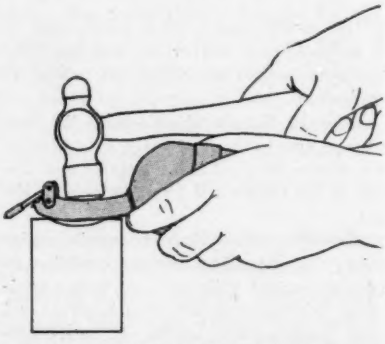


FIG. 2. BENDING FLOAT VALVE ARM

If the clearance space is not enough one way or the other, use a hammer and with light strokes bend the arm whichever way is desired. Be sure that the float ball is not touching the iron block upon which the bending is done. The reason for this is to keep the direct strain from the soldered joint that holds the ball to the arm. See Fig. 2 for the correct position the arm should be in while bending. The float ball must occupy a certain position in relation to the closed valve when placed within the coil. This certain position to be determined by float ball gauge as shown in Fig. 1.

Float ball gauges can be made of hard wood, one and one-quarter inches in thickness.

When it is found that the valve holds after releasing and applying 75 pounds pressure several times, clean the float valve thoroughly with dry air, and put in a clean place for future use.

Do not forget to use plenty of oil on the needle and seat when making this test, otherwise leaks will not be noticed.

SERVICE POINTERS

Readers are invited to send descriptions of "kinks" which they have found to be of practical help in their every day work. Just send your idea or sketch in the rough, which will be prepared for publication. All contributors' names will be printed. Address the "Kinks" Editor, REFRIGERATION SERVICE ENGINEER, 433 N. Waller Ave., Chicago.

Do Not Paint Coils or Condensers

Air cooled condensers, fin or plain tube type, or cooling coils in small installations, should not be painted. Paint prevents rapid transfer of heat and increases head pressure and electric bill.

Pipe Thread Dope

In the olden days litharge and glycerine were used. Today, automobile mechanics use a compound of white lead and shellac. It comes in convenient tubes, alike tooth paste, and is sold under various trade names as Permatex, Gasket Goo, etc. It is now being carried in kits of refrigeration service men for pipe threads.

What Size Motor?

Very often the service man must select an electric motor of ample horse power capacity to drive the compressor. The horse power required is proportional to head pressure, and back pressure; e.g., everything being equal, the higher the head pressure the greater the horse power; the higher the back pressure the greater the horse power, also the greater the displacement the greater the horse power.

A good approximate rule is as follows; for units less than one ton capacity: Divide cubic inch displacement per minute by 8,000 for Freon (F-12) or Methyl Chloride. Divide cubic inch displacement per minute by 10,000 for sulphur dioxide or Isobutane.

Floats Must Be Level

In shipment low pressure float clamps may come loose and should be re-leveled. Ice cream cabinets are heavy and often tipped up on end by delivery men. The float slips out of level, either sticks, remains open or shut. If back pressure remains either too high or too low, examine the float clamp.

Defrosting Cycle on Domestic Refrigerators

In defrosting household units it is general practice to set the thermostats and the pressure switches to cut out at about 15° F. close to the evaporator and cut in at about 30° F. The object is to keep the temperature below freezing within the vicinity of the evaporator in order to maintain continuous freezing of ice cubes even though the unit is not operating.

During this period the food compartment is usually maintained at about 40° F. but at a condition of low humidity, due to continuous frost on the evaporator. It draws the moisture out of the air and at the same time dries out the fruit and vegetables. Damp air at about fifty degrees in temperature preserves fruit or vegetables better. Therefore, some customers that do not use ice are greatly pleased if the service men set the thermostat so that the temperature rises above freezing point during the shut-down period and causes a defrosting of the evaporator. The damp air resulting maintains the higher humidity desired. Very often this suggestion to the user is the cause of the sale of a new thermostat and in addition maintains good will of the customer.

Weak Congealing Tank Fluid

If the alcohol, brine, or anti-freeze solution is too weak it may freeze. If the freezing point is higher than the cut-out point of switch setting, a long period of operation will result. We know of a case where a switch was set to cut-out at six degrees Fahrenheit. The operating period was seventy minutes, of which forty was required to freeze the solution at about seven degrees. Of course the shut-down period became greater also, but the seventy-minute operating period annoyed the user.

Test for Refrigerants

A safe method to use in ascertaining the kind of refrigerant in a system, in case the service man can not distinguish the difference in smell of Isobutane and Methyl Chloride, is to allow a small quantity to pour into a small glass or bottle. As either of these two gases are heavier than air they will pour out and sink to bottom. Isobutane burns with a yellow flame, while Methyl Chloride with a green flame. F-12 is odorless and will not burn.

Brine Solution

In mixing calcium chloride brine for ice cream storage tanks, etc., a freezing point of about 30° F. below freezing is usually allowed. A service man cannot carry a scale to weigh out the correct amount of calcium chloride and water. Therefore, use an ordinary three or five gallon pail as a measure. To one and one-quarter pails of calcium chloride add two pails of water; allow to cool and then fill brine tank. To check if brine is strong enough, not having a hydrometer or salometer, the service man may throw an Irish potato into the brine; if it floats, it is strong enough; if it sinks, add more calcium chloride.

Lapping Block

Lapping means leveling or facing steel or other material by rubbing on a level surface with grinding compound. In the shop a steel block is used; however, a piece of plate glass is a satisfactory substitute for the service man. Flanges and flapper valves may be faced by mixing a paste of oil and No. 800 carborundum; smearing on a piece of plate glass; and then rubbing the flange or valve evenly over the smeared level surface. Use new glass frequently.

Blow Torch Leak Finder

A small alcohol blow torch is now on the market; it is of great convenience to carry in the kit for soldering electrical connections, etc. However, the same alcohol torch furnishes a good flame to test methyl chloride leaks; a green flame appears when burning alcohol vapor is passed over a methyl chloride leak. Some leaks are discovered better with the soap and water bubble test; other leaks are discovered better with the flame test. Try both.

Thermometer Lag

Time is required for heat to be transmitted through the glass bulb of a thermometer. The service man is liable to be misled if this fact is not understood. For instance, if a thermometer is placed in the ice cube chamber of a domestic refrigerator equipped with a dry direct expansion coil (no congealing tank), the thermometer may not show a change of over 5° between cut-in and cut-out, while the actual variation of temperature in the chamber will vary from 5° at cut-out to 25° at cut-in. The shorter the shut-down period the less the variation in ice cube chamber as shown by a glass bulb thermometer. With a large congealing tank the glass thermometer more accurately registers the actual temperature condition because the shut-down period is longer.

Water Cooled Condenser Pressure

The following may be convenient in checking up approximate head pressure:

HEAD PRESSURE GAUGE

WATER OUTLET TEMP. FAHR.	SO_2	NH_3	CO_2	METHYL CHLORIDE	F-12
50°	26	98	782	47	58
60°	33	114	838	59	70
70°	45	138	939	71	84
80°	56	160	1037	85	97
90°	70	197	1185	104	117
100°	85	232	1325	123	136

The lower the back pressure the lower the head pressure and vice versa. The above table refers to about a 5° boiling point in evaporator.

Stopped Up Capillary Tubes

To remove the dirt or obstruction the tube must be uncoiled. Then a very fine, stiff steel piano wire about twenty feet long should be pushed through the tube. After the dirt is removed the tube may then be recoiled and re-installed. The piano wire cannot be pushed through the tube if the tube is not straightened out.

Electric Motors— Their Design, Construction, Operation and Servicing

A Thorough Knowledge of Motors by the Refrigeration Service Man Is Essential. This Is the First in a Series of Articles That Will Provide Valuable Information on Motors

CONSTANT improvements have been made in the design and construction of the household mechanical refrigerator since it was first introduced, and likewise the electric motors used as the driving force have kept pace with the improvement in mechanical equipment. Not only are the motors more economical and efficient in operation but also more silent and more sure of continuous operation.

It is the purpose of THE REFRIGERATION SERVICE ENGINEER to give its readers from time to time information concerning the design, construction, operation and servicing of the different types and makes of electric motors suitable for use in operating refrigeration units, oil burners and other household equipment. This month particulars in reference to the Leland electric motor are given from information supplied by J. J. Daggon, sales engineer of the Leland Electric Co.

Trouble Shooting

Ordinarily the entire motor will give years of service without trouble but to assist in detecting any difficulty which may occur, we are outlining below the most common ailments:

(1) *Loud Clicking Noise.* This may result from the brush lifter hook coming in contact with the short circuiting device. Only when necessary adjustment can be made in a Leland motor by placing a screw driver in the slot of the adjustment screw and turning right or left, so as to move the brush lifter hook sufficiently to overcome a clicking contact.

(2) *Jerky Operation.* This may result from grounded field coils. Should this occur, the motor should be returned to the manufacturer. This condition is very rare and is mentioned only to assist service-men in detecting trouble. A shorted armature might be indicated by spasmodic operation and can be detected by throwing on the power, lifting both brushes off the commutator and moving the armature around with the fingers. If the armature fails to make a complete revolution and seems to stick in a certain spot, this is evidence of a short.

(3) *Overheating.* Grounds, shorts, or overload condition may result in a motor overheating. If this condition is allowed to exist, complete burn-out might occur. In such a case, check for trouble in the bearings; and if there is no indication of trouble being located here, the motor should be returned to the factory.

(4) *Motor Fails to Start.*

No current.
Fuses blown.
Loose connection or short in wiring.
Brushes not making contact with commutator.
Difficulty in the bearings.
Motor burned out.

(5) For checking voltage to determine whether or not the supply source is 110 or 220, it is recommended that a 220 volt bulb be used. If when connected across the terminals of the supply source the bulb glows at full brilliancy, the supply is 220 volts. If the light is dim and glows at approximately one-half full brilliancy, this is an indication that the supply is 110 volts. If no 220 volt bulb is available, fasten two 110 volt bulbs in series, and proceed as outlined above.

Special Motors

Most manufacturers of small electric motors are prepared to make motors of special design to meet special conditions of

operation or application, but it is recommended that wherever possible a standard motor be used as they cost less and more prompt shipment can be made from the factory or branch stocks.

Voltage and Frequency

The standard voltages for which Type "R" Motors are wound are interchangeable, 110-220 volts unless otherwise specified.

Motors will operate successfully under the following conditions of voltage and frequency variations but not necessarily in accordance with the standards established for operation at normal rating:

Where the variation in voltage does not exceed 10 per cent above or below normal.

Where the frequency variation does not exceed 5 per cent above or below normal.

Where the sum of the voltage and frequency variation does not exceed 10 per cent (provided the variation in frequency does not exceed 5 per cent) above or below normal rating as stamped on motor nameplate.

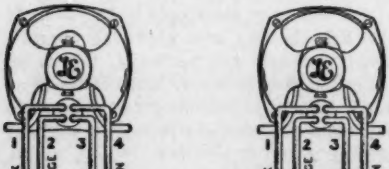
The starting and maximum running torque will vary as the square of the voltage; the speed varying directly with the frequency.

Fuses

To protect the wiring circuit as well as the motor, place a fuse in the line ahead of the motor. Size can be determined by selecting the next larger stock fuse than the amperage reading on nameplate. Stock fuses are obtainable at any electric shop in 3, 6, 10, 12, 15, 20, 25 and 30 amps.

Connections

Fig. 1 shows the method of connecting Single Phase Repulsion Induction Motor to 110 volt Circuit.



FIGS. 1 AND 2. CONNECTIONS FOR MOTORS

Connect leads 1-2 and 3-4 together, then connect the two resultant wires to the line.

Fig. 2 shows the method of connecting Single Phase, Repulsion Induction Motor to 220 volt Circuit.

Connect leads 2-3 together and tape ends, then connect leads 1 and 4 to line.

If desired to use the Single Phase Repulsion Induction Motor on a Polyphase Circuit, connect as above to any one phase of the polyphase circuit.

When direct current motors are supplied with three leads for starting box, No. 1 lead is the armature, No. 2 the field and No. 4 the armature and field, No. 3 place being left blank. If starting box is not used connect leads 1-2 together, then connect this resultant wire and 4 to line.

Direction of Rotation

The direction of rotation on all standard Type "R-P-D" motors will be (CC) counterclockwise facing the pulley end unless otherwise specified.

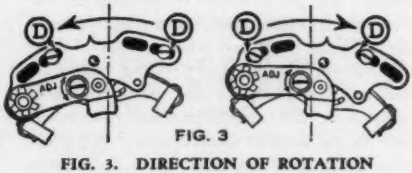


FIG. 3. DIRECTION OF ROTATION

On the standard open type "R" brush lifting motors the rotation is readily changed by removing two screws which hold the lifter to the frame of the motor, move the lifter to the new position, and insert the screws.

The motor will always rotate in the direction that the pointer of the brush lifting mechanism is shifted away from the vertical center-line of the motor.

Rotation Type P-D

Three phase type "P" motors can be reversed by interchanging any two line leads; two phase motors, by reversing two leads of one phase.

Direct current type "D" motors can be reversed by removing brushes, then end frames, pull leads back through ventilating ducts at bottom of stator and reassemble.

Direct Connecting

In connecting motors directly to the driven appliance, it is recommended that a flexible coupling be used rather than a flange or sleeve coupling. The flexible coupling will allow for reasonable mechanical errors in mounting and absorb a certain amount of end thrust which would normally be placed on the rotor.

Gear Connection

Care should be exercised in the selection of helical gears to secure those of such designs as will not place an end thrust on the rotor. Otherwise, provision must be made to take up this thrust. In the case of ball bearing motors care should be exercised that any existing end thrust does not exceed the rated capacity.

Bearings

The bearings of standard horizontal motors are made of phosphor bronze castings (the highest grade of bearing material obtainable) of ample dimension for the rated capacity of the motor. Sleeve bearings are wool waste packed and require but little attention. Fill the oil cups with a medium grade auto oil. When the reservoir is full, the oil will show up at the bearing housing overflow hole.

Ball bearings use semi-fluid grease or non-medicated vaseline.

Mounting

All Type "R," "P" and "D" standard 4, 6 and 8 pole sleeve bearing motors may be mounted in the conventional horizontal position, either right or left side wall, or inverted. It is understood, however, that standard sleeve bearing motors are NOT to be operated in the vertical position.

Brush Lifting Mechanism

Before attempting to make any adjustments or removal of Brush Lifting Mechanism, read all of the following instructions carefully.

Removal from Motor: Take out screws AA Fig. 4. (Motor must NOT be running.)

Assembly to Motor: Place mechanism into position as shown in Fig. 4 being sure that lifter arm encircles weights C Fig. 4.

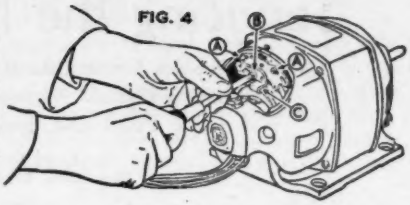


FIG. 4. BRUSH LIFTING MECHANISM

Place screws AA Fig. 4 in the position. The pointer of the mechanism should be lined up with the rotation mark stamped on motor frame, for proper rotation and power. If motor frame is not marked, the mechanism should be placed so that edge of slot D Fig. 3 is barely showing in the direction of rotation. Screw-driver slot in adjusting stud B Fig. 4 should be in horizontal position.

Adjustment: Start motor. Holding screw driver in slot of eccentric adjusting stud as shown in Fig. 4 with motor running make sure that the lifter arm is completely up. Holding lifter arm up as shown, turn adjusting stud slowly to right until the lifter arm ticks against short circuiting device weights, then turn back slightly to the left until ticking disappears and proper adjustment is obtained. If lifter arm is already ticking against weights when completely up and before turning stud to right, turn same slowly to left until ticking disappears. (The best adjustment is when lifter arm is as close as possible to the short circuiting device weights without ticking.) Try starting and stopping motor several times to make sure adjustment is correct.

Vapor Resisting Motors

Motor should be wired to circuit of same value as stamped nameplate. To change voltage of double voltage single phase motor, remove terminal cover and connect leads as indicated on nameplate diagram. Replace and tighten cover securely before placing motor in service. If desired to use a single phase motor or a polyphase circuit, see that the voltage connection is correct, and connect to any one phase of the polyphase circuit.

Servicing the Nizer Cabinet

The Nizer Ice Cream Cabinet Was Among the First of the Mechanically Cooled. A Large Number Are Still in Service. This Article Points Out Some Causes for Service Calls.

By P. JACOBSEN
Dependable Refrigerator Service

THE Nizer ice cream cabinet was the first refrigerator used on a larger scale for ice cream storage in the dealer's place of business.

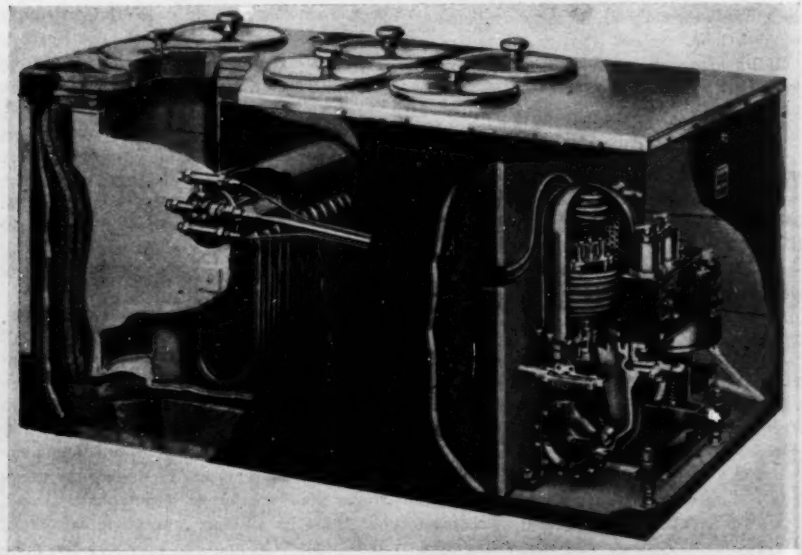
Made by the Nizer Corporation of Detroit, Michigan, this refrigerator rapidly became popular, and was used throughout the country by all progressive ice cream manufacturers, as they could see the possibilities of more sales by presenting their goods from an attractive cabinet, while they at the same time saved money by not being required to manufacture and haul ice and furnish the dealers with ice and salt every day.

As time has gone along, ice cream cabinets and compressors have been improved upon, but there still is in service a large number of Nizers not only on ice cream cabinets but also on soda fountains and on refrigerators in hotels and kitchens.

The ice cream cabinet consists of a brine tank with a number of sleeves to hold the ice cream containers, and inside this tank is an evaporator of the flooded type with removable head, so that the float valve can be changed should there be trouble at this point.

The machine is a single acting vertical compressor with intake valve in the piston. The refrigerant, which is sulphur dioxide, is discharged into a copper dome which fits down over the compressor and is bolted to the crank-case. This dome acts as a condenser and liquid receiver for the machine.

The crank-shaft extends through a stuffing box which has a high pressure graphite packing into the gear-case. The machine has a

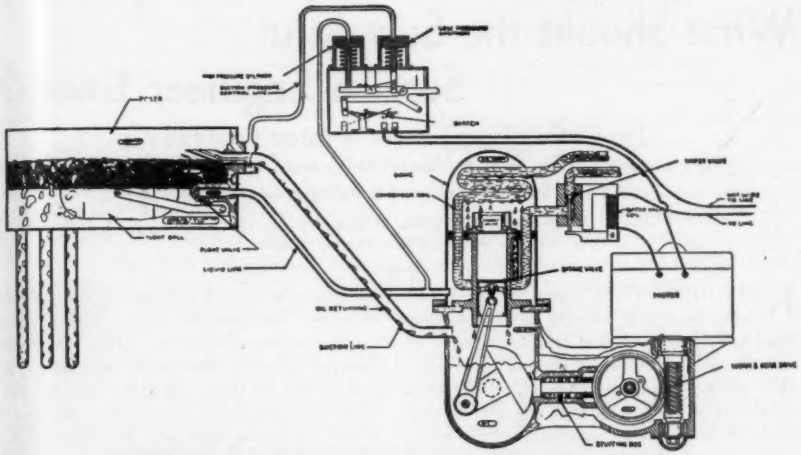


CUT-AWAY VIEW OF WATER COOLED ICE CREAM CABINET

worm and gear type drive, the gear is fitted on to the crank-shaft and the worm-shaft extends vertically through the casing.

The motor is a Remy universal motor and may be used on either AC or DC current, but only on 110 volts.

For higher or lower voltage a special field and armature must be used.



ILLUSTRATING THE REFRIGERANT, OIL AND WATER CIRCUITS

The armature fits over the worm-shaft and is removable, the field is bolted to the frame of the gear-case.

The crank-shaft runs in a bath of oil which must be carefully dehydrated before being used.

The gear-case is also filled with oil to insure proper lubrication of gear and ball bearings. This oil should preferably be of the same grade as used in the crank-case because of the possibility of stuffing box leaks.

The system is controlled by the pressure of the refrigerant in the "low side." The controller has a bellows type sylphon which acts through a number of levers on the contact points.

There is also a safety or high pressure sylphon on the machine which shuts off the current in case of high pressures.

This is an automatic restarting control.

If the proper care has been taken during the installation of the cabinet there is very little service on the machine; the three things giving the most trouble being: replacement of motor brushes; changing of worm-shaft bearings, and adjusting the switch points so they will not burn.

A motor of the repulsion and induction type has been developed by the Wagner Electric Corporation, but this requires that a ½ hp. motor be used instead of the ¼ hp. Remy motor thus increasing the current consumption.

A new type switch using a Mercoid or Contactor bulb is now replacing the old style copper contact points, thus eliminating two of the worst trouble makers on the Nizer compressor.

It is very important that the float valves are calibrated properly in these cabinets as a heavier or thinner oil blanket in the evaporator affects the temperature of the cabinet greatly. When making a service call it is therefore necessary to use both gauges and a thermometer at the same time and to adjust the control according to both.

It is possible to find two different cabinets running under the same back-pressure and still have different temperatures due to one evaporator having heavier oil blanket than the other.

Check the brine level from time to time as some evaporation is possible, also the cabi-

net may not have been filled properly when installed.

Low brine level will give soft ice cream on top and hard cream on bottom of the cans.

A stuffing box leak might occur, sucking all the oil from the gear case into the crankcase, also taking in air which will cause high pressure.

A pet-cock on the side of the gear case shows the service man whether there is enough oil or not.

The Kelvinator Corporation took over the Nizer Corporation a few years ago, and you will find quite a few Nizer controllers on Kelvinator machines installed in apartment houses.

What Should the Successful Service Engineer Know?

The Public Is Being Educated to Expect Good Performance. The Service Man Must Possess Certain Qualifications to Successfully Service Refrigerating Equipment.

By D. E. PERHAM, *Refrigeration Engineer*
Chicago Master Steam Fitters' Association

REFRIGERATION Service seems to have become a popular field attracting hundreds of men. Some few have years of experience and certain technical knowledge that enables them to succeed. Numerous others have only a limited experience and perhaps no practical knowledge of the principles of refrigeration. They fail in their work because of unsatisfactory results.

The service man and the refrigerating system he is called upon to service can be compared with the physician who is called upon to visit a patient.

The human body with its intricate mechanism includes a heating and cooling system that is very consistent as to its performance, its symptoms and responses to treatment of its ailments. So is the refrigerating system, with its operating principle based upon fixed laws of physics, equally consistent as to its performance, its symptoms and responses to treatment.

The experienced physician visits the patient, analyzes the symptoms, and his experience tells him the cause and how to correct the ailment. The experienced service man will visit the installation, observe the conditions, analyze the symptoms and his training tells him accurately the cause of the trouble and how to correct it.

Practical experience must be acquired. Some men improve their experience and knowledge with each service call, while others may not. For example: A man is called upon to service an installation. His experience may tell him that the trouble was caused by one of two or three conditions and he proceeds by process of elimination. The result is that he learns definitely the source of the trouble and corrects it. The other type of service man may also diagnose the trouble as one of two or three things, but instead of proceeding systematically he makes two or three regulations at once, and though in some instances satisfactory performance may result, he has not learned the definite cause. Naturally this type of man will not progress with the systematic type.

The actual man power requirements of the domestic and small commercial service field is rather misleading for the reason that the period of greatest sales was also a period dominated by the unsound practices of speculative building and the destructive competition that existed. It resulted in a wave of inferior installations, short of capacity, poorly constructed and incorrectly fitted to the work to be performed. There is now a definite trend toward installation to meet certain engineering standards and operating performance.

A practical example is: The Chicago Master Steam Fitters' Association, which maintains a complete set of Certified Re-

frigeration Engineering Standards for the use of its members.

Each installation is made to conform to definite standards of insulation, condensing unit capacity, evaporator capacity, compressor speed, motor HP and equipment location. Capacities are supplied adequate to meet the peak demands of hot weather.

The result of Certified Refrigeration is good performance, long life of equipment, economical operation and very little service.

Therefore, as present installations are replaced with better installations, the demand is for men with a better background of experience.

The public is rapidly becoming conscious of performance and results as the measuring stick of refrigeration. Users desire installations that are adequate to meet the peak loads of hot weather. Refrigeration has ceased to be a luxury or a novelty in the home or place of business. It has become a necessity for food preservation and for our personal comfort.

Service experience can only be acquired over a period of time. It may be called a course of training that is never completed because each year brings forth new designs, methods, applications and uses that present new combinations of conditions and new problems, although the principle of refrigeration remains the same.

The service engineer, to succeed, should possess a good personality, neat personal appearance, mechanical skill, some electrical knowledge and technical engineering training.

You may ask why are all of these qualifications necessary?

The answer is as follows: Personality is an asset to any one in any business or profession. Neat personal appearance usually reflects neat workmanship and the service engineer of the future will find much of the equipment in surroundings of expensive decorations and furnishings. It is imperative that he shall not damage or soil decorations or furnishings. Mechanical skill is essential to good workmanship. Electrical controls and drives are a part of almost every installation, and technical engineering training is necessary to understand the numerous service problems.

Performance and results is the future measuring stick for refrigeration; therefore, the service engineer with the qualifications enumerated will stand out because of his ability to perform the prompt, efficient and courteous service necessary for satisfied customers.

S S S

BEER COOLING AND SERVICING OF COOLERS

By THOMAS J. FOWLER
Standard Refrigeration Company, Chicago

THE cooling of beer is no doubt a new art to most of us; however, it is very similar to cooling water and other liquids at dispensing fountains. Care should be taken to supply ample refrigeration capacity for peak loads, as this load will no doubt change very rapidly from a small to a large demand. It will be well to exercise caution if an attempt is made to refrigerate the old-style coolers, that is, the bars that were in use before prohibition, as you may find that the coil box is not insulated. Ample beer cooling coils should always be used, forty to sixty feet of ⅜ inch block tin pipe per spigot, and a refrigerating coil with ample surface operated at a back pressure that will not form ice on the coil.

The brewer of today would like to have the keg stored in a room cooled to 50° F., or below. If this is practiced, the final, or coil load, will not be large. Beer must be served 38° to 40° F. at the glass, which would mean that 12° F. would have to be extracted from the beer going through the cooling coil.

A word regarding the various types of cooling coils and cleaning. The submerged refrigeration coil will not be affected to any great extent by steam cleaning the beer coils; however, I would warn against the use of steam for cleaning the direct expansion type coil. I understand 60 pounds steam pressure is used for this purpose; the temperature of steam at this pressure is slightly in excess of 300 B.t.u. The introduction of this heat into a direct expansion evaporator, or any evaporator that is loaded with refrigerant, will upset the plant if nothing more serious occurs.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

Refrigeration Service Men Organize

TRADE guilds, now called trade unions, date back to Biblical times. Carpenters and brick makers are mentioned frequently in the Bible. However, in this mechanical age, invention of a new mechanism gives birth to a new trade.

In the beginning, the manufacturer of the new machine trains a few men at the factory, how to maintain service and repair breakdowns after the machine is shipped, perhaps to foreign countries. They, in turn, teach the users of the machines how to service and repair. As time goes on, there is an expert mechanic everywhere who can repair a breakdown, that in the beginning could only be done by a factory-trained mechanic.

It is at this point that a new trade is established, when service and repair men are available everywhere, including the factory trained as well as the independent service man.

As a child separates from its mother, making two distinct individuals, so the trade of servicing, repairing and installation of machinery gradually separates from the parent factory. Years of experience and special service training schools help to make this operation possible, although many factories will continue to train and maintain their service organizations.

The domestic electric refrigeration industry is at this stage of development, is the opinion of Mr. Herbert Herkimer, Director of the Herkimer Institute of Refrigeration, the actual shop school, devoted exclusively to the training of electric refrigerator service and installation men.

Herkimer graduates who have set up successful service organizations of their own, together with representative independent service men, already established in business, as well as many factory trained service men felt the need of a national organization to further education and prosperity of its members. Accordingly a meeting was held on January 26, 1933, called by Mr. Herkimer, to consider the matter. About fifty were in attendance. Addresses were delivered by Mr. Herkimer and Mr. Harry Saks Heckheimer on the purposes of the proposed association and the advantages of organization. The idea was favorably received and it was resolved to organize, and most of those present signified their desire to join the movement.

The second meeting of those interested in

organizing the National Society was held on the afternoon of January 29th, 1933, at 2 o'clock, at 1819 Broadway, New York City.

President Herkimer presented the official form for application of membership in the Society, which was approved, and on motion it was decided that the initiation fee should be $5.00 and the annual dues $7.50. The organization of various committees was considered at this meeting.

HERBERT HERKIMER, New York
National President, R. S. E. S.

Adoption of Constitution and By-Laws

A third meeting was held on February 9th, 1933, presided over by President Herkimer. Mr. Harry S. Heckheimer read the application for certificate of incorporation and later in the meeting was authorized to apply for charter. Mr. Heckheimer also presented and read the proposed Constitution and By-Laws which, after some discussion, was adopted subject to further changes.

On motion Mr. Harold Herkimer was duly elected temporary Secretary of the National Society. On motion it was decided to have a dinner meeting on March 9th.

Dinner Meeting of March 9, 1933

According to arrangements made at the previous meeting, the fourth meeting was held on the evening of March 9th, and the business session was preceded by an excellent dinner, during which entertainment features were presented and an inspirational speech was made by Mr. H. S. Heckheimer, Consulting Attorney for the organization. Approximately 65 were in attendance.

After the dinner, the meeting was called to order by President Herkimer, who introduced Mr. J. F. Nickerson, of Nickerson & Collins Co., Chicago, publishers of *Ice and Refrigeration*, which organization had been asked to sponsor the new society and assist in its promotion.

Mr. Nickerson gave particulars regarding plans for developing the society into a real national organization, and in order to better serve the society and promote its educational

H. T. McDERMOTT, Chicago
National Secretary, R. S. E. S.

work, announced that it had been determined to start the publication of a new magazine which would be the official organ of the society and known as THE REFRIGERATION SERVICE ENGINEER, devoted exclusively to the interests of those engaged in service work. He also called attention to various changes in the Constitution and By-Laws designed to regulate the various activities of the society, and to protect its members in the conduct of their business. All of these changes met with approval. After considerable discussion regarding initiation fees, dues and other features, announcement was made that Mr. Harold Herkimer, temporary Secretary, had resigned in favor of Mr. Harold T. McDermott, of Chicago, which would thus facilitate the handling of promotional activities of the Society to be carried on from the Chicago office; the Presidency as well as the Treasurership remaining in New York. The election of Mr. Frank A. Bohen, Manager of the Eskimo Pie Corp., Brooklyn, N. Y., as Vice-president of the national society, and Mr. Emil J. Merenda, of Brooklyn, as Treasurer, was announced.

A Letter From the President

Dear Brothers, Members of the R. S. E. S.:

Informed people are rapidly recognizing the educational benefits of meetings, lodges, or societies. Practically every profession and trade has its association or society. It is organized expression of a desire for progress.

One of the first benefits to you, a member of the Refrigeration Service Engineers Society is the appearance of your name on a card as an accepted and recognized member of the craft. It gives you identity and standing.

The membership list of a reputable engineering society generally represents the leaders of the profession. Broad visioned employers and employees value a man according to his society. You will be valued accordingly.

Think of the opportunity of meeting new faces, and making new friends possibly the greatest assets you as a man can have.

However, the one great advantage the R. S. E. S. to you is the accumulation of ideas and information that will be of value to you in your work.

Please read carefully the constitution of the Refrigeration Service Engineers Society. You will have a distinct memory of its object:

(1)—To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation.

(2)—The principal means toward this end shall be the holding of meetings, for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information.

(3)—For social intercourse.

Participation in discussion at the meetings not only broadens your ideas, but also accustoms you to thinking while standing and addressing an assembly. You obtain confidence in speaking which experience bears interest in conversation with customers.

Where is this mechanic, unaccustomed to the smooth talk of the business world going to get his experience in tactful conversational methods? Active participation in the meetings and work of the society develops the diffident mechanic into a forceful talker that gets business.

What better work can a society do than improve your mind with the latest ideas of refrigeration progress and develop you into a business man and go-getter?

Time is money. If you give your time to the society and actively participate in the meetings, the society will be the means of giving back to you the equal of time which is money.

In closing may I remind you, do not forget the date of the next meeting of your Chapter. If you are a member-at-large, keep in touch with the work of the Educational and Examining Board through the National Secretary.

Yours truly,

HERBERT HERKIMER, *President.*

May 25, 1933.

NEW YORK CITY CHAPTER ORGANIZED

ON March 23, 1933, a meeting of service men in New York City was held at 1819 Broadway, New York City. Mr. Herbert Herkimer presided, who, after announcing the purpose of the meeting, introduced Mr. J. F. Nickerson, of Chicago.

Minutes of the previous meeting of the National Society were read by Secretary Harold Herkimer, and approved.

Announcement was made that the proposed change in the name of the National Society as originally tentatively adopted was to be "Refrigeration Service Engineers' Society." After some discussion a motion was made and adopted approving the change.

On motion a resolution was adopted that a New York Chapter of the Society should be organized and that application should be made to the National Society for a charter.

At the request of the Chairman, Mr. Nickerson presented a Constitution and By-Laws that had been proposed for Chapters of the National Society. The Constitution was first read and discussed, and on motion unanimously adopted. The reading of the By-Laws was then taken up and each article discussed as read. Announcement was made of the proposal of the National Society to make concession to those who joined the Society in the near future, by waiving the initiation fee for 1933 and fixing the annual dues for the remainder of the year at $5.00. After considerable discussion this method was, on motion, duly adopted by the New York Chapter, it being understood that one-half of the special fee of $5.00 be remitted to the National Treasurer, the balance to be used by the local Chapter.

The name of the Chapter was decided upon and the dates for the future meetings set for the evening of every second Tuesday.

The next order of business was the election of officers to serve for the balance of the calendar year. The following officers were nominated:

FRANK A. BOHEN, Vice-Pres. New York Chapter

EMIL J. MERENDA, Treasurer New York Chapter

H. R. CORNELY, Secretary New York Chapter

President, Herbert Herkimer.
Vice-president, F. A. Bohen.
Secretary, H. R. Cornely.
Treasurer, E. J. Merenda.

On motion, the secretary of the meeting was directed to cast one ballot for the election of the officers nominated. This was done and they were declared elected.

Several service men present at this meeting indicated their desire to organize a Chapter in Northern New Jersey, and as some of these members had already paid their dues to the New York Chapter, the motion was made and carried that the sum of $2.50 of the amount paid in by the New Jersey members be turned over to the New Jersey Chapter when formed. The meeting then adjourned.

Meeting of April 4

This meeting was devoted principally to the educational activities of the Chapter, and in order to permit as much time as pos-

sible for this purpose this talk preceded the business meeting. President Herkimer introduced Mr. Israel Kramer, of the Trenton Auto Radiator Works, who proceeded to address the Chapter on the "Theory of and Importance of Condensers in Refrigeration."

To illustrate the many important features which he explained, sections of evaporator tubes were displayed, stressing the particular feature of the thermal bond between fin and tube, which is further insured by metallic fusion for permanency. This construction prevents corrosion and prevents any loosening of fins through rough handling or expansion and contraction. In completing the construction of the evaporator, Mr. Kramer explained the entire coil is immersed in a molten bath of bright tin, then steam cleaned, dehydrated and sealed. The talk proved of much interest to the members.

After the educational part of the program, President Herkimer opened the business session and reviewed the suggested order of business adopted for Chapters by the National Society. Twenty-four members were present at this meeting.

Meeting of May 11

The meeting was called to order by President Herbert Herkimer, at 8:15 p. m., in Room 312, 1819 Broadway, New York City, and the usual business of the Chapter disposed of.

A resolution was presented and adopted, expressing the opinion of those present that it would be harmful to the experienced service man, as well as the manufacturer of refrigerating units, to have so-called manuals circulated to inexperienced and untrained persons, who might undertake to tinker with, or repair a refrigerating unit with the possible result of damage to property or loss of life.

Following the business session, Mr. Elliot, engineer of the Carrier Products Corp., Newark, N. Y., was introduced as the speaker for the educational part of the program. Proceeding his talk, Mr. Elliot described the extent of the activities of his company through talking motion pictures, which described the two million dollar air cooling and conditioning system in the New Roxy Theatres at Radio City, a recent engineering accomplishment of the Carrier Corp.

Mr. Elliot's talk was confined to the advantages of cold diffusers and the salient features which he described were as follows:

1. Refrigerating rooms remain sanitary because sweating of walls and ceilings is eliminated.
2. Stale air and foul odors are prevented, thus giving ideal conditions for product storage.
3. Cold diffusers operate at high suction pressures, increasing plant capacity and reducing power consumption.
4. Defrosting troubles can be entirely eliminated.
5. Since coil bunkers and bunker doors are now needed, their cost is eliminated.
6. Cold diffusers require less space than coils, thus increasing useful storage space.
7. Cold diffusers have 100 per cent salvage value when removed to a new location.

OFFICERS NEW YORK CHAPTER

HERBERT HERKIMER, *President*
Director Herkimer Institute of Refrigeration, New York City

Mr. Herkimer has had many years experience in the refrigeration field. He was for some years connected with the Brunswick-Kroeschell Co. at Chicago, the Arctic Ice Machine Co., Canton, Ohio, and was General Manager of the American Carbonic Machinery Co., Wisconsin Rapids, Wis. His higher education was as mechanical and electrical engineer at Cornell University. He has been engaged in refrigeration work since 1906 and is much interested in extending education and knowledge in refrigeration engineering in all its branches.

FRANK A. BOHEN, *Vice-President*
Eskimo Pie Co., Brooklyn, N. Y.

Mr. Bohen received his higher education at Columbia University, N. Y., and at the University of Heidelberg, Germany. He was formerly connected with the Brunswick-Kroeschell Co., New Brunswick, N. J. Mr. Bohen at present is Manager of the Eskimo Pie Co., of Brooklyn, and the servicing of ice cream cabinets is one of his important problems.

EMIL J. MERENDA, *Treasurer*
Brooklyn, N. Y.

Mr. Merenda received his education in the public schools of New York City and the City College of New York. He is also a graduate of the Herkimer Institute of Refrigeration. Mr. Merenda has been very successful in operating two automobile service stations under the name of Eddie's Automotive Repairs. Desiring to expand his business, the servicing of electric refrigerators appealed to him and he accordingly established the M. and R. Refrigeration Service in Brooklyn. At the present time he is servicing over 1,000 refrigeration units.

H. R. CORNELY, *Secretary*
New York City Chapter

Mr. Cornely was for two years, 1927-28, with the Standard Oil Company of New York, at the Mt. Vernon bulk station. Specialty man, handling of grease, lubricating oils and miscellaneous products.

From 1929, to present time, with Sylvestre Oil Company, Inc., a subsidiary of the Standard Oil Company of New Jersey. His experience here has been fuel oils, for domestic as well as commercial work.

NORTHERN NEW JERSEY CHAPTER ORGANIZED

PURSUANT to a call for a meeting on April 11, by Mr. Edward Lampa, of Hoboken, N. J., refrigeration service men from various localities of New Jersey, adjacent to Jersey City, responded. The purpose of this meeting was to consider the formation of a local Chapter of the Refrigeration Service Engineers' Society. The majority of the members who attended were familiar with the purpose of the Society, through their attendance at the formation of New York City Chapter No. 1. Mr. J. F. Nickerson, publisher of THE REFRIGERATION SERVICE ENGINEER, Chicago, was requested to outline the purposes and objects of the National Society, and the requirements for the formation of a local Chapter.

After Mr. Nickerson's talk, a motion was formally introduced and adopted to the effect that, inasmuch as it was the consensus of opinion of those present that a New Jersey Chapter would be advisable for the further education of the refrigeration service men, that a petition be presented to the National Society for a charter.

Accordingly every member present signed the petition for charter, and also approved and adopted the Constitution and By-Laws. It was decided that this Chapter would be designated as Northern New Jersey Chapter No. 1, and that its territorial jurisdiction would include from New Brunswick to the northern boundary of the state.

On motion regularly moved, seconded and carried, the following officers were unanimously elected to office, to serve until the annual meeting:

President, John C. Hummelt.
First Vice-president, Joseph Nolan.
Second Vice-president, Myron W. Geddes.
Secretary-Treasurer, Edward Lampa.
Sergeant-at-Arms, Joseph G. Schenk.
Chairman Educational Committee, Gunnar Berglind.
Chairman Membership Committee, Richard W. Chase.
Directors, Walter W. Kempf, Paul R. Redyke and Claude N. Buyers.

It was further decided that regular meetings of Northern New Jersey Chapter No. 1 would be held every second and fourth Wednesdays.

Meeting of April 26

Northern New Jersey Chapter No. 1 held its second meeting on April 26, with President John C. Hummelt presiding, and the minutes of the organization meeting of April 11 were read and approved. This meeting was devoted to the discussion of the business of the local Chapter, and under the heading of "For the Good and Welfare of the Organization," it was decided that members hearing of any special inducements in new or used refrigeration equipment submit them in writing to the secretary, who in turn would advise the membership.

Meeting of May 10

After disposing of the usual business of the meeting, it was decided that the Chapter should arrange to secure a larger hall and

make arrangements for an educational lecture on a subject of pertinent interest to the members, and that all service men in the jurisdiction of Northern New Jersey Chapter No. 1 be invited to attend the lecture, with the purpose in mind to increase the Chapter's membership. The Educational and Membership Committees were authorized to make the necessary arrangements.

GREATER CHICAGO CHAPTER ORGANIZED

APPROXIMATELY forty service men responded to the call of the R. S. E. S. meeting on May 2, 1933, to consider the organization of Greater Chicago Chapter No. 1. The meeting convened at 8:00 p. m. in the Engineering Building, and was called to order by H. T. McDermott, secretary of the National Society. Mr. J. F. Nickerson, publisher of THE REFRIGERATION SERVICE ENGINEER, who has been actively engaged in the formation of the National Society and local Chapters, was introduced and explained at length the purposes and objects of the Refrigeration Service Engineers' Society, and the necessary requirements for the formation of a local Chicago Chapter.

After Mr. Nickerson's talk Mr. McDermott was elected chairman and an interesting discussion followed, participated in by many of those present, after which the following resolution was introduced and unanimously carried:

> WHEREAS: It is the consensus of opinion of those present that it is desirable to organize a cooperative society for the purpose of further education and elevation of men engaged in the business of installing and servicing domestic and small commercial equipment, and for social intercourse, now therefore be it
>
> RESOLVED, That we immediately proceed to form and organize a local Chapter of the Refrigeration Service Engineers' Society by the adoption of a Constitution and By-Laws, in conformity with that of the National body, and that we further proceed to elect temporary officers and make formal application to the Refrigeration Service Engineers' Society for charter for a local Chapter.

The proposed Constitution and By-Laws were read, and it was decided that the local Chapter should be known as Greater Chicago Chapter No. 1, with a territorial jurisdiction of the greater metropolitan area within a radius of fifty miles of the city, and that meetings should be held every second and fourth Tuesdays of the month. It was also moved that formal action on the adoption of the Constitution and By-Laws should be deferred until the meeting on May 9, and that in the meantime copies of this Constitution and By-Laws should be forwarded to all in attendance for their consideration.

It was further decided that, if time permitted, some portion of the meeting of May 9 would be devoted to the subject of "Beer Coolers."

Meeting of May 9

The meeting was called to order by Mr. McDermott in the Sherman Hotel, Chicago, and the minutes of the meeting of May 2 were read and approved.

The Constitution and By-Laws were read and unanimously adopted. The next consideration was the election of officers, and a motion was made and seconded that a Nominating Committee be appointed by the chair. The Committee consisted of Messrs. H. Goldberg, John Northcote and Harry Busby.

During the time that the Committee retired to prepare its report, Mr. Thomas Fowler discussed "Servicing Beer Coolers," which proved an interesting subject, and many members participated in the general discussion which followed.

A summary of Mr. Fowler's talk on this subject is printed elsewhere in this issue.

The Nominating Committee reported that its recommendations were ready, and suggested the following nominees:

President, Thomas J. Fowler.
Vice-president, Ralph B. Vanston.
Treasurer, E. J. Edmiston.
Secretary, F. W. Kap.

The chair announced that further nominations might be made from the floor, and C. E. Hamilton was nominated for President, and R. L. Hendrickson was nominated for First Vice-president. It was suggested that, in order to better acquaint the members present with the qualifications of the nominees, they state their experience, which was accordingly done.

After a brief discussion, it was decided that the officers to be elected would serve temporarily, or until the charter membership was closed.

It was further moved and carried that, inasmuch as no nominations were made for Second Vice-president or chairman of the Educational and Examining Board, the candidate receiving the largest number of votes for president would be elected president, and the second largest number would be elected chairman of the Educational Committee. Likewise, for vice-president, the candidate receiving the largest number of votes would be first vice-president, and the candidate receiving the second largest number of votes would be second vice-president.

The chair appointed W. J. Hawkins and W. Bashaw as judges of the election, and Paul Jacobsen and George Delaney to distribute and collect ballots. The results of the election were announced as follows:

President, Thomas J. Fowler.
First Vice-president, Ralph B. Vanston.
Second Vice-president, R. L. Hendrickson.
Treasurer, E. J. Edmiston.
Secretary, F. W. Kap.
Chairman of Educational Committee, C. E. Hamilton.

The officers were then introduced and the gavel turned over to President Fowler. Inasmuch as Greater Chicago Chapter No. 1 was now formally organized, it was moved and seconded that formal petition for charter be presented to the National Society, and accordingly forty-eight members present signed the petition.

Meeting of May 23

About fifty service men were in attendance as President T. J. Fowler called the meeting to order in the Sherman Hotel. All officers were present and the usual business disposed of. A letter received from the National President, Herbert Herkimer, was read, conveying his best wishes for the success of Greater Chicago Chapter.

President Fowler announced his appointments of the following committees:

COMMITTEE ON STANDARDS
Henry Sidenbecker
George Delaney
Harry Busby

INVESTIGATING COMMITTEE
Arthur Reque
John Northcote
Jack Hourihan

MEMBERSHIP COMMITTEE
H. DeGan
C. Hart
R. Vanston

After the business session, President Fowler turned the meeting over to Mr. C. E. Hamilton, chairman of the Educational Committee, who presented a talk on "Going on a Service Call," which is printed in part on another page of this issue.

Mr. Roy Burton, of the Gates Rubber Co., was then introduced, who gave an interesting talk on "Belts for Domestic and Commercial Refrigerators."

OFFICERS OF GREATER CHICAGO CHAPTER

A GROUP photograph of the officers elected by Greater Chicago Chapter No. 1, together with a brief account of their experience in the refrigeration field is presented herewith.

THOMAS J. FOWLER, *President*
Standard Refrigeration Company

Mr. Fowler has been active in the refrigeration industry for over twenty years. He has designed numerous machines adaptable to various refrigerants. His latest development in this field is the "American Ace," a totally enclosed commercial unit. He has had practical experience with carbon dioxide, ammonia, propane, methyl chloride, sulphur dioxide and butane refrigerants, both in low and high temperature application.

Mr. Fowler has been connected with the York Ice Machinery Corp., Vilter Manufacturing Co., McClellan Refrigerating Machine Co., Howe Ice Machine Co., H. G. Saal Co., Tunison Soda Fountain Co., Servel, Universal Cooler, Climax Engineering Co., American Foundry Equipment Co., Norge and Copeland.

He is a graduate engineer and has held numerous positions as consulting and chief engineer, and has always been active in the design, manufacture, application and servicing of refrigerating apparatus. Mr. Fowler has been a resident of Chicago for thirty-two years.

TEMPORARY OFFICERS, GREATER CHICAGO CHAPTER NO. 1 REFRIGERATION SERVICE ENGINEERS' SOCIETY
From Left to Right—R. L. Hendrickson, 2nd Vice-president; E. G. Edmiston, Treasurer; R. B. Vanston, 1st Vice-president; T. I. Fowler, President; F. W. Kap, Secretary; C. E. Hamilton, Chairman Educational Committee.

From Left to Right—R. L. Hendrickson, 2nd Vice-president; E. G. Edmiston, Treasurer; R. B. Vanston, 1st Vice-president; T. I. Fowler, President; F. W. Kap, Secretary; C. E. Hamilton, Chairman Educational Committee.

RALPH B. VANSTON, *First Vice-President*
Great Northern Refrigeration Service

Mr. Vanston had ten years experience with ammonia machines before the war, and since then on all makes and kinds of direct and indirect expansion refrigerating machines. He has been located in Chicago since 1920, and was formerly connected with the Stover Co. as service man and also in the Engineering Department. At present Mr. Vanston has his own service organization, the Great Northern Refrigeration Service, Chicago.

R. L. HENDRICKSON, *Second Vice-President*
Ace Refrigeration Sales Co.

Mr. Hendrickson was with Servel, Inc., of Los Angeles, and Servel dealers for five years, during which time he worked in the test department and did outside service work.

After he had put in five years actual work, he enrolled in the University of California and attended for two years. During this time he was associated with Magoon's Refrigeration Service of Oakland in the capacity of engineer. After finishing his course in the University, he returned to Los Angeles and became associated with O'Keefe & Merritt Co. He was Special Service Representative for Southern California, and remained with this company for one year.

Mr. Hendrickson became instructor for the National Refrigeration School for one year, and at the same time was associated with the Atlas Refrigeration Service of Los Angeles as Service Manager. At the present time Mr. Hendrickson is associated with the Ace Refrigeration Sales Co., Chicago.

FRANK W. KAP, *Secretary*
City Refrigeration Service

Mr. Kap has had over ten years' experience in electrical and refrigeration engineering, which included work in Mexico, Central and South America and the Hawaiian Islands. At present he is affiliated with the City Refrigeration Service, Chicago.

E. G. EDMISTON, *Treasurer*
Diversey Refrigeration Service

Mr. Edmiston has spent several years in the automobile industry, specializing in starter, lighting and ignition, and internal combustion engines. In this field he served with the Locomobile Co., of Chicago, and the Pierce Arrow Co., of Denver, Colo., in the capacity of Master Mechanic and Service Manager.

He was next connected with the Stover Co. of Chicago, distributor of Delco Light and Frigidaire. With this firm he was Service Manager, organizing, training and assisting the entire field organization. Mr. Edmiston was with this firm for ten years. For one year Mr. Edmiston was Sales and Service Manager for Donald S. Stophlet, of Tampa, Fla., Frigidaire distributor, but was forced to resign due to illness.

Mr. Edmiston has been located in Chicago for the past year in the refrigeration service field. His entire experience in the mechanical refrigeration industry has been in the service and engineering division. Having received both technical and practical mechanical training in the automobile industry, the subjects on refrigeration were readily digested, and in this field, he received intensive training with the Frigidaire organization.

C. E. HAMILTON, *Chairman*
Educational Committee
Matchless Refrigeration Service

For the past three years Mr. Hamilton has been associated with the Matchless Refrigeration Service. Two years prior to his present connections, he was employed as service manager for Hamilton & Son, a firm engaged in mechanical refrigeration work, but specializing in building, selling and installing orange juice equipment using ice and mechanical refrigeration.

Mr. Hamilton was also employed as service man by the Atlas Soda Fountain Co. for one year previous to the two above mentioned connections. His work there consisted of installing and servicing the mechanical refrigerated soda fountains sold by this company, as well as taking care of the other commercial installations made by them in meat markets, grocery stores, etc.

Other firms with whom he has been connected in various capacities are the Blue Valley Creamery, Supreme Ice Cream Co., Peerless Ice Cream Co., and the City Cooperative Dairy.

The New Air Cooled Electrolux

Air Cooling Is First Major Development Since the Introduction of the Gas Refrigerator. Design of New Electrolux Described. New Color Chart Shows Cycle of Operation.

DEVELOPMENT of a new air cooled gas refrigerator was announced on March 28 by H. H. Springford, president of Electrolux Refrigerator Sales, Inc., subsidiary of Servel, Inc. It will be manufactured in five domestic sizes, and ultimately in all sizes.

In addition to air cooling, the new gas refrigerator will have two-temperature control, with a five-variant temperature regulator. This will provide, according to the announcement, for much quicker ice cube freezing, quicker response to heavier refrigeration demands due to outer temperature changes, and non-stop defrosting, a feature said to be unique with the gas refrigerator. Another development is a trigger device on each ice tray to facilitate easy removal.

"The entire refrigerating unit in the new air-cooled Electrolux will be without moving parts and completely silent," Mr. Springford's announcement stated. "As in the water-cooled unit, the whole refrigerating process is accomplished according to physic-chemical laws and gravity, by inter-action and reaction of hermetically sealed air, ammonia, water, hydrogen and methyl chloride, supplemented by a little gas flame which acts as the sole motivating agent."

Air Cooling Major Development

Air cooling is the first major development since the gas refrigerator was announced seven years ago. In most respects the unit is quite similar to the water-cooled Electrolux. The main refrigerating cycle is much the same. A small gas flame applied to the generator containing a 30 per cent solution of ammonia and distilled water vaporizes the ammonia and starts it on its cooling process.

Flowing on to the condenser, the ammonia gas is liquefied by the cooling action of the room atmosphere over the fin-type coil. The room temperature, it is claimed, in no way affects the refrigerating efficiency, as the ammonia condenser in the new unit is of two-channel construction; when the load is light the ammonia passes through only a part of the coil, but when the room temperature is higher and the load heavier the ammonia automatically flows through the entire coil, subjecting it to a greater cooling surface.

New Evaporator Construction

From the ammonia condenser the liquid ammonia then passes into the lower section of the evaporator, which is of new and radical construction. It is of the two-temperature type, with a low temperature freezing coil directly in contact with the ice trays and an upper or secondary coil which is used for cooling the box as a whole when the necessity demands. Hydrogen gas within the refrigerating cycle, flowing in counter-direction from the ammonia, produces a rapid evaporation of the ammonia, thereby withdrawing heat from the ice trays and the box and thus causing refrigeration to take place.

As the ammonia evaporates in the presence of hydrogen, the mixture, which is heavier than hydrogen itself, flows by gravity downward through the heat exchanger into the absorber. The upper section of the absorber is in direct connection with the weak liquid portion of the generator and by means of gravity the weak liquid flows over the baffle plates within the absorber, absorbing the ammonia gas from the mixture in the absorber. This strong liquid then flows down to the bottom of the absorber, passing through the liquid heat exchanger and back to the boiler, where the process starts all over again.

In the process of absorption taking place within the absorber, heat is given off by the ammonia, and to absorb this heat a secondary system employing methyl chloride has been used. The methyl chloride circuit is an independent one, having its own condenser.

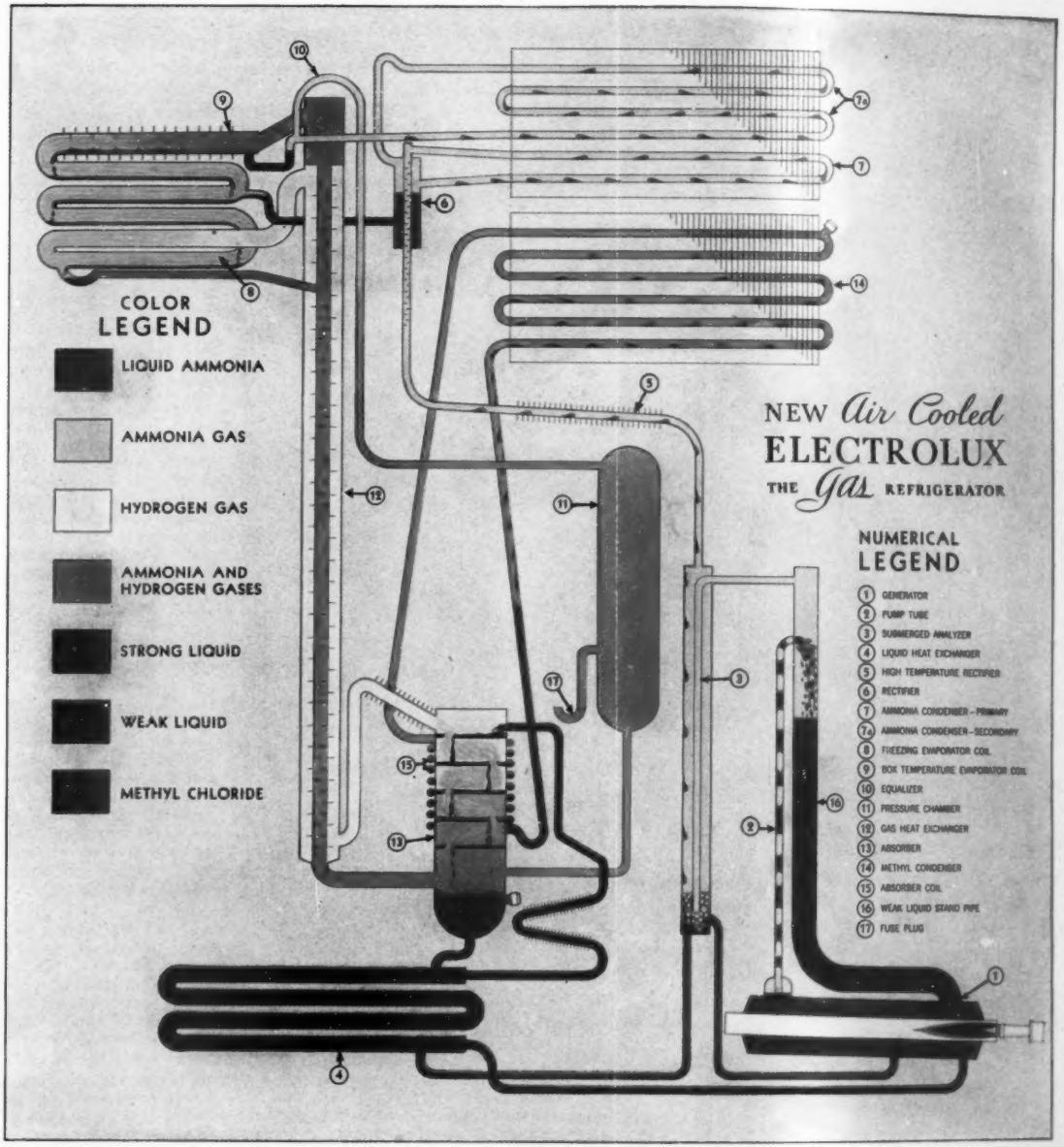


CHART SHOWING CYCLE OF OPERATION OF THE NEW AIR COOLED ELECTROLUX GAS REFRIGERATOR

The cycle of operation of the new air-cooled Electrolux is best illustrated by the accompanying chart in colors, which clearly shows the flow of liquid ammonia, ammonia gas, hydrogen gas, ammonia and hydrogen gases, strong liquid, weak liquid and methyl chloride in this new unit.

For the benefit of the service engineer the operation of the unit is described herewith in detail with references to the colored chart.

Description of the Cycle of Operation

The Electrolux unit is charged with a small quantity of aqua ammonia (distilled water and ammonia) and hydrogen. The charge distributes itself naturally in the unit, the liquid seeking the lowest levels and the hydrogen filling the remaining space.

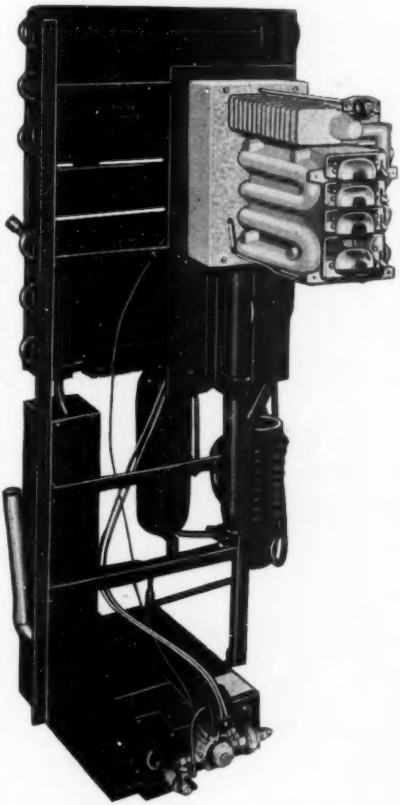
With the application of heat at the Generator (1), ammonia vapor is driven off from the strong solution (aqua ammonia) and together with small quantities of the strong solution is raised through the Pump Tube (2) to the Weak Liquid Stand Pipe (16). Ammonia vapor with traces of water vapor is driven off in the Generator (1) leaving the aqua ammonia solution comparatively weak in ammonia (weak solution). The hot ammonia vapor passes from the Generator (1) through the Submerged Analyzer (3) High Temperature Rectifier (5) and Rectifier (6) where the small amount of water vapor entrained is condensed and drains to the Generator (1).

The hot ammonia vapor reaches the Lower Ammonia Condenser (7) where part of it is liquefied by cooling. The liquid ammonia maintains a level in the Rectifier (6) causing the liquid ammonia to flow into the Freezing Evaporator Coil (8). The remaining part of the ammonia vapor is liquefied in the Upper Ammonia Condenser (7a) and the resultant liquid flows to the Box Cooling Evaporator Coil (9). In the evaporator the ammonia liquid evaporates with the resulting absorption of heat.

In a cold room the greater part of the ammonia vapor liquefies in the Lower Ammonia Condenser (7) and is available for freezing cubes by evaporation in the Freezing Evaporator Coil (8). Since very little liquid flows to the Box Cooling Evaporator Coil (9) it is possible to obtain fast freezing without excessive cooling of the box.

As room temperature or refrigeration load demand increases the thermostat functions to increase the generator heat input and raises a greater amount of ammonia vapor to the condenser. This additional vapor is condensed in the Upper Ammonia Condenser (7a) and flows to the Box Cooling Evaporator Coil (9). This arrangement tends to maintain a more uniform box temperature with varying room temperature without the necessity of changing the temperature control setting.

An atmosphere of hydrogen gas continually sweeping the surface of liquid ammonia in the evaporator coils keeps removing the ammonia vapor and causes continued evaporation. The ammonia vapor thus formed in the evaporator mixes with hydrogen gas and the mixture is made to flow upwardly through the evaporator. This permits the location of the Box Cooling Evaporator Coil (9) in its most effective position; namely, at the top; and at the same time, the hydrogen gas which is saturated with ammonia passing upward from the Freezing Evaporator Coil



FRONT VIEW OF AIR COOLED UNIT

(8) is enabled to pick up more ammonia at the higher temperature prevailing in the Box Cooling Evaporator Coil (9). Still another advantage results from the pre-cooling of the liquid ammonia coming from the Ammonia Condenser—Upper Part (7a) before it enters the Freezing Evaporator Coil (8). These features greatly increase the capacity of the unit.

REAR VIEW OF AIR COOLED UNIT

In case all the ammonia vapor is not condensed in Upper Ammonia Condenser (7a) on account of high room temperature, the vapor passes through the Equalizer (10) to the Pressure Chamber (11) which contains a quantity of reserve hydrogen. This results in displacement and transfer of reserve hydrogen into the Absorber (13) thereby increasing the pressure in the system to the point where all the ammonia is liquefied in the Lower Ammonia Condenser (7) and Upper Ammonia Condenser (7a). When the room temperature becomes lower, the reserve hydrogen returns to the Pressure Chamber (11). This automatic pressure change permits very efficient operation of the unit under normal room temperature conditions, as it is not necessary to initially charge the unit with a high pressure to enable satisfactory operation under extreme conditions.

In the Gas Heat Exchanger (12) cool heavy gas from the evaporator comes in thermal contact with warm light gas from the Absorber (13) effecting a heat exchange and increasing the unit efficiency. The long column of heavy gas rich in ammonia in the center of the Gas Heat Exchanger (12) readily overbalances the short column of heavy gas in the evaporator, thereby causing the desired upward flow in the evaporator.

A flow of weak solution being returned fro.n the Generator (1) through the Liquid Heat Exchanger (4) contacts the ammonia and hydrogen gas mixture entering the Absorber (13) and the ammonia is dissolved. The hydrogen returns to the evaporator.

The heat which is liberated by absorption of ammonia in the Absorber (13) is carried away by the vaporization of a small quantity of methyl chloride in the Absorber Coil (15). This vapor liquefies in the Methyl Chloride Condenser (14) thereby dissipating the heat. The liquefied methyl chloride returns by gravity to the Absorber Coil (15).

From the Absorber (13) the strong solution is returned by gravity to the Generator (1), passing through the Liquid Heat Exchanger (4) where a heat transfer is accomplished because of the difference in temperature of the weak and strong solutions. After passing it then returns to the Generator (1) through bottom of submerged Analyzer (3) where part of the heat in the vapors leaving the Generator (1) is recovered by serving the useful purpose of driving some ammonia from the strong solution. This results in a further increase in efficiency. Continued refrigeration is merely a repetition of this cycle.

APPLIANCES CATALOGUE

A NEW illustrated catalogue and price list of refrigeration appliances, tools and sundry supplies for the service engineer has just been issued by the Service Men's Supply Company, 1819 Broadway, New York City. The catalogue gives the percent of discount allowed to manufacturers, distributors and dealers. Independent service men, who are members of local master associations and certificate members of the Refrigeration Service Engineers' Society are recognized as dealers.

Servicing Oil Burners—

A potential market for the refrigeration service man. Thorough understanding of heating fundamentals required in order to successfully service oil burners

A DEFINITE relationship exists between refrigeration and heating, and certain parallel fundamental engineering principles cover both. Both are a household utility, finding increasing application each year, and constantly opening a greater field of endeavor for the qualified service man. Because of seasonal service demands in both refrigeration and oil heating, they afford an ideal combination for developing an all year service business, and service organizations can maintain their full operating personnel without seasonal layoffs.

Oil Burner Service Stations

Many leading manufacturers of oil burning equipment maintain direct factory sales organizations in important geographical locations, which include a well organized service department. In other locations, sales and service are rendered through distributors and franchised dealers, who are required to maintain an established service organization.

Some of these dealers are merchandising a household utility line, such as refrigerators, radios and washing machines. In the appointment of such a dealer, the responsible oil burner manufacturer desires that some individual in the organization be designated as the oil burner service man, and that he attend the factory school training course of about a week's duration, and also attend a school for a short period each year, in order that he may be familiar with the new improvements and developments which have been made.

In an interview recently with a representative of one of the leading oil burner manufacturers, he informed the writer, "The matter of burning oil in a well constructed oil burner has certain uniform basic principles, and the success of the installation of the oil burner is largely dependent on the application of these basic principles in each individual installation."

Further he said, "It should be remembered that an oil burner is not a 'cure-all' for all heating problems, and many complaints received for service have no bearing whatever on the efficiency of the oil burner, but may be attributed to an entirely different cause. For instance, if it has been impossible to heat a certain room or rooms in a home through the former method of coal heating, it is improbable that the oil burner can rectify such a condition, inasmuch as such a condition may be entirely a matter of proper distribution of air, and naturally is outside of the servicing end of the business. Of course, the experienced service man should be in a position to detect this condition, and to suggest a possible remedy.

Making the Right Installation

"The reputable manufacturer of oil burning equipment endeavors to avert such a condition, or to inform the purchaser as to what might be expected of the heating equipment. It has been found in some instances that salesmen without the proper knowledge, intentionally or otherwise, anxious to make a sale, have advised that the oil burner is a solution to all troubles, without taking into consideration that their applications in various types of systems, such as hot water, steam, vapor and warm air, require a close study. A reputable manufacturer today will not consent to an installation of an oil burner until the sale has been carefully checked by their engineering department, which will prevent many unnecessary calls after the installation is made.

"In other words, if the present heating system is not applicable for oil burning requirements," this representative says, "responsible companies would rather not make a sale than have a dissatisfied customer and

probably spend more money in servicing than the profit on the installation." The usual guarantee for all installations is for the duration of one year.

Servicing Oil Burners

In order to successfully service oil burner installations, it is essential that the service man fully acquaint himself with the various types of burners, and make a close study of their operating principles. Four distinct types are now on the market, which are classified as follows:

1. Gravity or natural draft burner.
2. Pot type.
3. Spinner burner.
4. Nozzle or projected flame type of burner.

The first two named are more or less of an obsolete type, and are not being extensively installed at the present time.

In specifically recommending what the successful service man of oil burners should know, this representative outlined the following requisites:

1. *Knowledge of electricity.* Many burners operate on low voltage controls of less than 110 volts, and some others are ignited by high voltage apparatus; many others maintain a small pilot flame constantly to ignite the fuel oil.

2. *Knowledge of combustion.* In order to properly ascertain whether or not an oil burner is operating as efficiently as it should in its application, a service man should be somewhat familiar with combustion engineering, enabling him to make CO_2 tests, combustion chamber temperature tests, and further check-ups at vital points.

3. *Knowledge of application.* A further understanding for proper servicing should include a knowledge of the various applications to different heating systems, which, as stated above, are hot water, steam, vapor and warm air.

4. *Knowledge of heat transfer.* To understand thoroughly whether or not oil burning equipment is operating at its fullest efficiency, the service man should thoroughly familiarize himself with the value of reflected heat, and the Btu transfer from flue gases to the boiler. A further study of the heat absorbing capacity of boilers is essential.

Common Calls for Service

The most common calls for service, of course, are for the adjustment of burners. This adjustment may be necessary because of the fact that the wrong fuel oil is being used, and as a consequence proper combustion is not being performed, and the burner will quickly carbonize.

A check-up of the grade of oil being used is necessary, and the manufacturer's recommendation should be followed in this respect.

Another frequent service call is that the burner does not respond promptly to changing conditions. This fault is usually found in the fact that the thermostat is not properly located. If the thermostat is located in the hall, or a room which is likely to cool very slowly after once being heated, in relation to the balance of the house, naturally there will be no action until the room has cooled down to the pre-determined setting on the thermostat, and vice versa.

Other trouble calls may be due to oil not feeding, which may be caused by dirt in feed lines or tanks, which must be removed. Motor troubles, of course, can be easily detected by a service man familiar with small motors.

The servicing of oil burners affords a field for the refrigeration service man who is qualified to render a satisfactory service, and the man who is desirous of building a responsible community business must ground himself in the fundamental principles of proper heating requirements.

S S S

NEW KRAMER CATALOG

TRENTON Auto Radiator Works, Trenton, New Jersey, announce publication of their new refrigeration catalog. The new catalog is complete in all details and lists ten fin sizes for commercial work. These ten fin sizes can be assembled into any over-all size, the manufacturers state.

The new catalog contains data valuable to any refrigeration engineer, as well as listings for Domestic Evaporators, Condensers for high sides, Unit Coolers and Ammonia coils, together with a complete line of refrigeration fittings and controls.

Copy of the catalog may be had by addressing the manufacturers.

Refrigeration Service in a Nut Shell—

by Herbert Herkimer

Service Calls Can Be Classified in Two Divisions—Complaints and Trouble Shooting. Herewith Is Published Two Valuable Charts to Aid the Service Man in Diagnosing Troubles. Others Will Follow.

A detective has two lines of procedure,

(A) Having a clue, he trails the criminal.

(B) Having no clue, he searches for a clue.

The service engineer is in the same predicament, he has two lines of procedure,

(A) Complaints of customer, who gives the specific clue.

(B) Trouble shooting, no specific clue being given.

The duty of a service engineer is,

1. To discover the cause of specific *complaint.*
2. Or to discover the complaint which we will call trouble shooting.
3. To repair the system in the most practical and economical manner.

Having defined the line of procedure the writer, at the request of graduate students of the Herkimer Shop Service School, has organized a table which we call the COMPLAINT CHART, consisting of eight charts, listing 18 complaints, of users of electric refrigeration.

The major complaints coming in to the service shop usually discovered by the user is *poor refrigeration.* Poor refrigeration is usually associated with:

1. Too high temperature which causes slow freezing of ice cubes and foul smelling food.

The minor complaints usually discovered by user:

1. Squeaking, humming, thumping.
2. Odors due to gas leaks, etc.
3. Continuous running.
4. Refusal to start.

One COMPLAINT CHART will appear in eight successive monthly editions of the REFRIGERATION SERVICE ENGINEER, the first of which is published on the page following.

However, a situation arises at times in which no specific complaint has been made. Something is wrong, but no clue has been given. It may be safely assumed that a used refrigerator needs an adjusting or overhauling which comes in this classification, which we will call *trouble shooting:* looking for trouble even though it may not be there. The writer has organized another chart, which we will call the TROUBLE CHART, which lays down a rule of procedure in this situation. The trouble chart is published on page following.

The eight COMPLAINT CHARTS combined with the use of the TROUBLE CHART bound in a loose leaf pocket folder has proven of assistance to the most experienced service engineers. The writer will be pleased to answer all questions if mailed to the Secretary, Refrigeration Service Engineers' Society, 433 N. Waller Avenue, Chicago, Ill.

SERVICE HAND BOOK

THE publishers of THE REFRIGERATION SERVICE ENGINEER desire to announce the first edition of *The Service Engineer's Hand Book* will be completed and for sale January 1, 1934. In the meantime, each issue sue of this journal from June to January will contain one or more pages of the data book, which may be cut out and inserted in a morocco leather cover obtained from the Refrigeration Service Engineers' Society for the sum of $1.00.

This leather binder is a substantial six-ring, flexible morocco book, which has been especially designed for convenient use when on the job. It can be carried in the pocket and is of standard size, so that additional sheets may be obtained for making notes and sketches. It is attractively stamped in gold with the Society's name on the front cover in gold.

COMPLAINT CHART NO. 1

C=CAPILLARY TUBE
LF=LOW SIDE FLOAT
HF=HIGH SIDE FLOAT
DA=AUTOMATIC EXPANSION VALVE
DT=THERMOSTATIC EXPANSION VALVE
T=THERMOSTAT CONTROL
P=PRESSURE CONTROL

CAUSES OF COMPLAINT	SYSTEMS: LF T	LF P	HF T	HF P	C T	DA T	DT P
COMPLAINT NO. 1—CONTINUOUS OR LONG RUNNING WITH TOO HIGH TEMPERATURE							
(a) Undercharge of refrigerant	√	√	√	..	√	√	√
(b) Overcharge of refrigerant	..	..	√	√	√	....	....
(c) Leaky float valve needle	√	√	√	√	..	..	..
(d) Stuck shut float needle or expansion orifice	√	..	√	..	√	√	√
(e) Dirty strainer, plugged line	√	..	√	..	√	√	..
(f) Inefficient compressor	√	√	√	√	√	√	√
(g) Stopped up capillary tube	..	..	..	..	√	....	....
(h) Stuck open float valve	√	√	√	√	..	..	..
(i) Excess air in system	√	√	√	√	√	√	√
(j) Congealing tank solution too weak	√	√	√	√	√	√	√
(k) Complete stuck open expansion valve	..	..	..	..	..	√	√
(l) Capillary tube too long or small	..	..	..	..	√	..	..
(m) Split gasket between two cylinders	√	√	√	√	√	√	√
(n) Overloaded compressor	√	√	√	√	√	√	√
(o) Too high temperature condensing medium	√	√	√	√	√	√	√
(p) Too small a condenser, oil, scale, or fuzz on condenser	√	√	√	√	√	√	√
(q) Oil bound flooded evaporator	√	√	..	..	..	..	..

Cut out along outer line and insert in binder for ready reference.

FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY, 433 N. WALLER AVE., CHICAGO, ILL.

TROUBLE CHART

TROUBLE / CAUSES ← → EFFECTS	R	P	T	L	M	S	J	Y	X
	EFFECTS OBSERVED ON LOW SIDE			EFFECTS OBSERVED ON HIGH SIDE					
	Frost	Back Pressure	Refrigeration	Liquid Line	Top Condenser	Head Pressure	Jumpy Compressor	Cycle	General
(1) EXCESS ORIFICE INTO EVAPORATOR (a) Stuck open float valve (b) Stuck open expansion valve (c) Expansion valve not adjusted	Suction Line May Frost Up	High	Poor or None	Norma or Warm	Hot	Slightly Higher	Somewhat Jumpy	Continuous	Hissing Sound in Valve
(2) TOO SMALL ORIFICE (a) Stuck shut float valve (b) Stuck shut exp. valve (c) Closed receiver valve (d) Plugged strainer (e) Plugged liquid line (ice, dirt) (f) Closed compressor shut off valve (g) Expansion valve needs adjusting	Slight or No Frost on Evaporator or Expansion Valve	Very Low or Vacuum	Poor or None	Normal	Cool	Lower	Normal	With Thermostat Control Continuous — In flooded will cycle until pumped down	
(3) EXCESS REFRIGERANT (a) Careless in charging	Normal Unless Very High Head Pressure	Normal Unless Very High Head Pressure	Normal Unless Very High Head Pressure	Normal	Hot	High	Very Jumpy	Long On Short Off	
(4) SHORTAGE OF REFRIGERANT (a) Leaky seal under pressure (b) Leaky joints (c) Careless charging	Slight or No Frost	Normal or Low	Poor or None	Warm	Cool	Low	Normal	Continuous	Hissing at Orifice
(5) AIR IN SYSTEM (a) Leaky seals or joints (b) Neglect in purging	Normal with Full Charge Refrigerant	Normal	Poor	Norma	Hot	High	Very Jumpy	Long on Short Off	
(6) POOR COMPRESSION (a) Bad compressor discharge valve (b) Bad piston rings, split gasket (c) Bad compressor suction valve	Slight or None	High on off Cycle	Normal Unless Very Bad	Normal When Very Bad Cool	Normal But Cool When Very Bad	Normal Unless Very Bad Then Low	Normal	Long on Cycle But Normal off with Thermostat	
(7) THERMOSTAT (a) Bulb too far from cold spot (b) Pressure switch too low	Frosted	Normal	Very Cold	Normal	Normal	Normal	Normal	Continuous or Very Long On	
(8) MISCELLANEOUS Continuous running also caused by leaky Thermo-Bulb; too close differential: High head pressure sometimes due to motor running backward	Leaky Expansion valve. Switch Set Too Cold. Stuck Switch Causing Continuous Running. Causes Excess Frost		Thermostat or Pressure Switch Not Adjusted Properly. Ice on Coils. Poor Refrigeration	Frost if Receiver Valve Closed or Liquid Line Plugged	Cool When Back Pressure Low and Vice Versa	High Head Press. Due to Blocked Air Circulation High Temp. or Not Enough Co'l'g Med.	Excess Oil Retards Condensation and Causes High Head Pressure	Continuous Running Caused by Stuck Thermostat Bellows Leak Oil Bound Overload or Loose Belt	Leaky Expan Valve Causes High Back Pressure on Off Cycle

Cut out along outer line and insert in binder for ready reference.

FOR LEATHER BINDER WRITE TO H. T. McDERMOTT, SECRETARY REFRIGERATION SERVICE ENGINEERS' SOCIETY, 433 N. WALLER AVE., CHICAGO, ILL.

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 1 JUNE, 1933 No. 1

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

WHY THE SERVICE ENGINEER?

MAN may wear out during work and grows old with age, so too machinery wears out working and with age. Man has recourse to the trained physician to keep him fit to perform his tasks and prolong life.

A piece of machinery or working equipment must depend on trained and experienced men to be kept fit to do the work for which it was intended and to prolong its life of usefulness.

There comes a time when all types and kinds of machinery for all sorts of purposes, both large and small, intricate and simple, no matter how automatic, needs attention of a skilled engineer if its usefulness and efficiency is to be maintained.

Therefore the service engineer.

It has been demonstrated beyond question that the small household refrigerating machine has established itself as a permanent fixture in millions of homes.

With approximately 3,500,000 of these machines in use, with the likelihood of increasing numbers going into operation, it is quite evident there is a wide field for the service man at present, and still greater possibilities in the future.

The large number of refrigerating units in use, widely spread over the country, has created the necessity for prompt efficient and intelligent response to emergency calls for immediate servicing of out-of-commission refrigerator units upon which, the preservation of costly foods and beverages is always dependent.

Here is certainly sufficient incentive to inspire any man, young or old, to acquire the knowledge and experience necessary to become a really efficient service engineer. It is not enough to know one make of machine, or one refrigerant.

To-day and to-morrow there is and will continue to be a demand for men who are able to service several makes of machines, the out-of-production makes, as well as the latest new one on the market. A knowledge of the properties and the handling of various refrigerants used to-day is also necessary.

The information is available to those who have ambition to excel in their chosen vocation and willingness to work hard and study diligently. It is such an attitude that justifies the refrigeration service engineer.

S S S

CREATE CONFIDENCE

SOME very good advice for men new to the servicing of electric refrigerators, oil burners and other mechanical apparatus, was given in the talk delivered before a recent meeting of the Chicago Chapter, R.S.E.S., by the chairman of its educational committee. Referring to the service man connected with an organization selling refrigeration equipment, emphasis was placed upon the duty of a service man to build and strengthen the customer's confidence in the company product, or if operating or employed by such a firm, the same duty was incumbent upon the service man for building and maintaining the user's confidence in the machine, as that would help at the same time to create confidence in the service man and the firm.

As a measure for building up confidence between the manufacturer and the service engineer, Mr. Hamilton advised the service man to be a "booster," or at least not to be a "knocker" of any machine. He said "If you help to keep the customer happy and satisfied with the machine he bought, it is bound to have a favorable effect on the manufacturer, and to help bring about better cooperation." Good advice and in line with the present practice of service men.

Going on a Service Call

Some Points That Are Well to Consider. Address in Part Delivered at Recent Meeting of Chicago Chapter, R.S.E.S.

By C. E. HAMILTON
Chairman Educational Committee, Greater Chicago Chapter No. 1, R.S.E.S.

THERE are three ways of doing anything, the wrong way, just to get by, and the right way. Common sense, the best guide in the world, tells you that of these three there is only one proper way, the right way. There is a right way to do the actual mechanical work required to put a machine in working order and a right way to handle the user of a refrigerating machine. In going on a service call the user merits as much, or sometimes more attention than the machine. You are calling on him at a time when his machine is not giving satisfaction and he is more or less disgusted with it.

As this is a mechanical age, with all kinds of mechanical and electrical appliances being used in the home and in business, the user of mechanical devices has become educated to the fact that units mechanically operated require a reasonable amount of attention from time to time and expect occasional failures in the operation of such units. However, due to the many marvelous inventions and, to some extent, misleading advertising, the idea that nothing is impossible today, has also been created. This last condition has had some effect on the forming of the impression that mechanical units have reached that unobtainable point of being "perfect." Perfection, like perpetual motion is beyond the reach of man, for nothing has been done or made but what improvements can be effected.

With these facts or conditions in the mind of the user it follows that though the customer may expect his refrigerator to require a certain amount of attention and servicing, that servicing must not greatly inconvenience him if his confidence in mechanical refrigeration is to be maintained. If you are connected with an organization handling the sale of a line of refrigeration equipment it is your duty to build and strengthen the customers confidence in your company's product. If you are operating an independent service station, or employed by such a firm, you have the same duty for building the user's confidence in the machine which helps, at the same time, to create confidence in you or your firm. The wagging tongue of a satisfied customer is the most effective advertisement possible.

Keep the Customer Sold

There is another point here not to be overlooked by the independent service station. No doubt all of you have, at some time, or other, experienced difficulty in obtaining parts from certain manufacturers of refrigeration machines. Much can be done toward getting better cooperation from these manufacturers by being a "booster," or at least in not being a "knocker" of their machine. If you help to keep the customer happy and satisfied with the machine he bought it is bound to have a favorable effect on the manufacturer and to gradually help bring about better cooperation.

The first step on the part of the serviceman toward preventing loss of confidence in a machine that is not rendering satisfactory service is to answer all service calls promptly.

The work should be done as quickly as possible in keeping, of course, with thoroughness and accuracy. Each part of the complete installation must be carefully gone over to see that all are functioning properly. Callbacks because of too much haste or lack of attention to all details on the first call means a loss of confidence in the service man.

Promptness, neatness, accuracy, thoroughness and courtesy are essential qualifications of the serviceman which build confidence and good-will for his organization, its product and himself.

NEW MECHANICAL DEVICES
Service Tools and Special Equipment

Under this heading there will be published illustrated descriptions of new or improved service tools and equipment for the Service Engineer.

SERVICE TOOLS

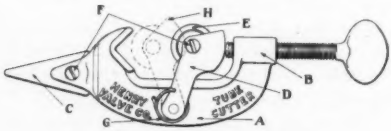
THE comparatively new vocation of installing and servicing small refrigerating units, oil burners and other household mechanical equipment has developed a need for improved labor saving devices, and special tools that will speed up and make more efficient the work of the Service Engineer.

Among the manufacturers in this field is The Henry Valve Company of Chicago, who for years have been supplying the refrigeration industry with valves and fittings. This company recently have announced the introduction of their new line of service tools for copper, steel and aluminum tubing installations. The items which are described below have many improved features which according to the manufacture will speed up installation and repair work.

"Henry" Tube Cutter and Reamer

Description of Parts

A—Malleable iron frame
B—Long thread in frame for feed-screw
C—Tool steel reamer
D—Pivoted cutter arm and housing



TUBE CUTTER AND REAMER

E—High grade, oil tempered, tool steel cutter wheel
F—Removable cutter wheel and reamer
G—Spring return on cutter arm
H—Shielded cutter, arm housing protects wheel in "closed" position

Unlike many cutters now in use the "Henry" Tube Cutter and Reamer has the cutting wheel located in the pivoted cutter arm which is held in an open position by means of the spring tension.

"Simplex" Charging Connection

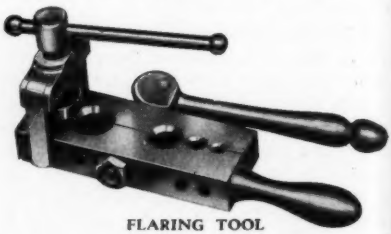
This item should meet with the instant approval of service men who have wanted a flexible charging connection for methyl chloride and sulphur dioxide. The hose is made from brass tubing that has been

CHARGING CONNECTION

fabricated into a series of helical convolutions which insures great flexibility. The hose is protected from injury by means of a braided copper armor. The outlet connection is made of a piece of copper tubing which is soldered directly into the hose proper. After the tubing has been reflared a number of times it can be replaced quickly by soldering a new tube in position.

"Duro" Flaring Tool

Several features of construction should make this tool popular with the trade. The

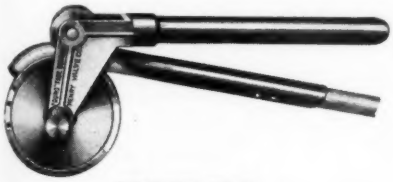


FLARING TOOL

tubing is locked into position by means of the cam designed lever which is so constructed that excessive wear can be compensated for by merely tightening the hexagon nut which is illustrated. The flaring head assembly, when inserted in the location holes on the side of the block, automatically centers itself over the tubing which is to be flared. A new special alloy metal, never before found in flaring tools, is used in making the flaring cone. This metal, according to the manufacturer, is very durable and acquires a higher polish through constant use.

"Duro" Bending Tool

An examination of this new product shows it to be very rugged in construction. Tubing is inserted in the lower handle and by



BENDING TOOL

merely turning the upper handle, the tubing is tightly gripped and a perfect bend formed of any desired angle. It can be operated with an amazing speed on one-half and five-eighths inch tubing.

The business announcement of the Henry Valve Company appears on another page of this issue.

MERCOID

AUTOMATIC CONTROLS

Mercoid Controls are known the world over for their unfailing performance.

Use them on your control replacement jobs and be assured of trouble-free installations.

They are exclusively equipped throughout with mercury sealed contact switches and will operate indefinitely without any breakdown.

Complete line of controls available for refrigeration, automatic oil burners, and air conditioning equipment.

Learn more about the Mercoid Line. Catalog sent upon request.

GIVE COMPLETE SATISFACTION
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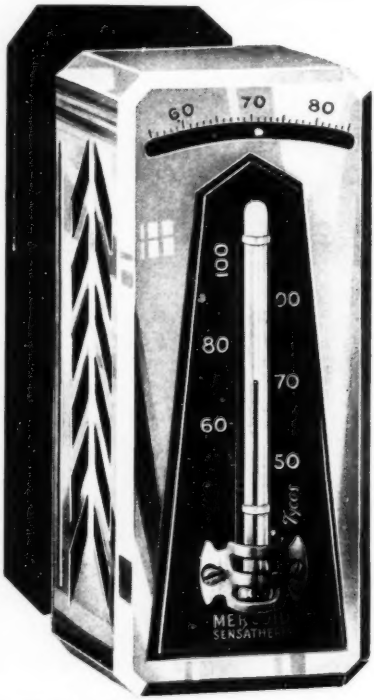

Heating Type—Actual Size

MERCOID SENSATHERM

FOR LOW OR HIGH VOLTAGE APPLICATIONS

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Mercoid Sensatherms are used with all types of electrically controlled heating and cooling equipment.

They are objects of beauty and mechanical perfection—very sensitive, extremely accurate and dependable in operation.

Several types and ranges are available.

Type H, for heating applications, opens the circuit with a rise in temperature.

Type R, for cooling applications, opens the circuit with a drop in temperature.

Type HR, Dual Sensatherm, combines in one unit both the heating and cooling instruments.

Mercoid Sensatherms are used in conjunction with the Mercoid Transformer-Relay, which is quite different in construction and operation from other relay devices on the market. It is in principle a low voltage transformer but also operates as a repulsion relay

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